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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/665,940	09/21/2000	Chishio Koshimizu	07553.0008	8913

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EXAMINER
UMEZ ERONINI, LYNETTE T

ART UNIT	PAPER NUMBER
1765	13

DATE MAILED: 02/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/665,940	KOSHIMIZU ET AL.	
	Examiner	Art Unit	
	Lynette T. Umez-Eronini	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 23-32 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 23-32 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 23, 24 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriya et al. (US 5,494,522) in view of Komino et al. (US 5,769,952).

Moriya teaches a plasma processing method that comprises:

A lower electrode **308** is arranged in etching chamber **301** and the wafer **W** is mounted on the lower electrode **308** (column 10, lines 58-59), which reads on,

a step in which a workpiece is placed at a mount surface of an electrode provided inside a plasma processing chamber.

High frequency voltage is added between the upper **314** and the lower electrode **408** (column 12, lines 7-8). This voltage is analogous to the DC voltage that is added from a high voltage DC power source **10** and **63** (column 3, lines 4-9; column 4, lines 50-54; and column 8, lines 1-5) in Figures **1** and **2** and is used to attract and hold wafer **W** on the top of the electrostatic chuck **8**. Hence, the aforementioned reads on,

a step in which said workpiece is vacuum-held by applying a high level DC voltage to an electrostatic chuck provided at said mounting surface of said electrode.

Operating the etching process system wherein the vacuum process chamber **301** is set at 10^{-6} Torr (column 11, lines 51-57) reads on,

a step in which plasma processing is performed on said workpiece under a reduced pressure atmosphere.

Moriya also teaches "The gate valve **306** of the auxiliary vacuum chamber **302** which is under normal pressure is opened and the carrier unit **317** is extended to the auto-loader **318** through the opening **305** to carry the wafer **W** from the auto-loader **318** into the auxiliary vacuum chamber **302**. The gate valve **306** is closed and the auxiliary vacuum chamber **302** is exhausted vacuum through the exhaust pipe **319**. The gate valve **304** is opened to communicate the vacuum (reduced pressure) process chamber **301** with the auxiliary vacuum one **302**" (column 11, lines 54-62), which reads on,

a step of opening a means for opening/closing which switchably connects said delivery chamber to said plasma processing chamber for transfer of said workpiece from/to said plasma processing chamber, wherein said step of opening introduces said gas from inside said delivery chamber into said plasma processing chamber.

Moriya differs in failing to teach a step in which said electrode is moved from an upper plasma processing position to a lower delivery position after said plasma processing ends, **in claim 23**.

Komino teaches, "After completion of etching, . . . The susceptor is at the lowered position during wafer **W** transfer, but at the raised position near the gas emission means (upper electrode) **306** during plasma etching" (column 14, lines 12-

19), which reads on a step in which said electrode is moved from an upper plasma processing position to a lower delivery position after said plasma processing ends.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Moriya by using Komino's method of moving the electrode from an upper plasma processing position to a lower delivery position after said plasma processing ends for the purpose of easily transporting a processed wafer.

Moriya in view of Komini differs in failing to teach the pressure inside said delivery chamber and the pressure inside said plasma processing chamber are set roughly equal to each other before said electrode reaches the lower deliver position, **in claim 24**.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to set the pressure inside the delivery chamber to be roughly equal to the pressure inside the processing chamber before said electrode reaches the lower delivery position for the purpose of preventing harmful gases from flowing one chamber into the next chamber.

3. Claim 23 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriya ('522) and Komino ('952) as applied to claim 23 above, and further in view of Horiuchi et al. (US 5,155, 331) and Dhindsa et al. (US 5,904,799).

Moriya in view of Komino differs in failing to teach wherein after the electrode completes its descent operation, the workpiece is lifted form the mounting surface of the electrode by a lifter pin, **in claim 25**.

Horiuchi teaches, " . . . semiconductor wafer **13** to be processed is conveyed into reaction container **1** through a lock room (not shown) from a wafer cassette of a convey system (not shown). This conveying of semiconductor wafer **13** is achieved according to a predetermined program. Semiconductor wafer **13** is received in higher position than the position of electrode **14**, by lifter pins **17** which have been lifted higher than the upper surface of lower block electrode 14 by lift system 19 through through-holes 16. When lifter pins 17 is lowered (or when electrode **14** is uppered), semiconductor wafer **13** is contacted with the upper surface of lower block electrode **14** through the cooling gas gushed from the electrode **14**" (column 4, line 62 - column 5, line 7). Since Horiuchi uses the same method of delivering the wafer from one chamber (load lock chamber) into a plasma processing chamber like that of the claimed invention, then using Horiuchi's method would inherently result wherein after the electrode completes its descent operation, the workpiece is lifted from the mounting surface of the electrode by a lifter pin as in the claimed invention.

It is the examiner's position that tit would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Moriya in view of Komino by using Horiuchi's method of lifting a workpiece for the purpose of enhancing uniform etching (Horiuchi, column 7, lines 56-62).

Moriya in view of Komino and further in view of Horiuchi's differs in failing to teach wherein at least a portion of the lifter pin, which contacts the workpiece is electrically conductive, **in claim 26**.

Dhindsa teaches, "A substrate lifting arrangement **109** includes an actuator **110** and a lifting mechanism **112** having three or more, e.g., four, lifting pins **114** . . . the various components making up the lifting arrangement **109** are typically electrically conductive . . ." (column 1, lines 28-34). Dhindsa further teaches, "However, in accordance with the invention, by controlling the discharge using resistance arrangement **226**, the problem described above in the background of damaging portions of the substrate due to high voltage currents concentrated through small areas of the substrate which are in direct contact with the lifting arrangement may be minimized by proper selection of the resistance for resistance arrangement **226** (column 4, lines 43-50).

It is the examiner's position that tit would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Moriya in view of Komino and further in view of Horiuchi by using a conductive lifting pin as taught by Dhindsa for the purpose of minimizing damage on portions of the substrate (Horiuchi, column 4, lines 45-50).

4. Claims 28, 29, 30, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Moriya ('522) in view of Horiuchi (' 331).

Moriya teaches a plasma processing method that comprises:

A lower electrode **308** is arranged in etching chamber **301** and the wafer **W** is mounted on the lower electrode **308** (column 10, lines 58-59), which reads on,

a step in which a workpiece is placed at a mount surface of an electrode provided inside a plasma processing chamber.

High frequency voltage is added between the upper **314** and the lower electrode **408** (column 12, lines 7-8). This voltage is analogous to the DC voltage that is added from a high voltage DC power source **10** and **63** (column 3, lines 4-9; column 4, lines 50-54; and column 8, lines 1-5) in Figures **1** and **2**) and is used to attract and hold wafer **W** on the top of the electrostatic chuck **8**. Hence, the aforementioned reads on,

a step in which said workpiece is vacuum-held by applying a high level DC voltage to an electrostatic chuck provided at said mounting surface of said electrode;

operating the etching process system wherein the vacuum process chamber **301** is set at 10^{-6} Torr (column 11, lines 51-57), reads on,

a step in which plasma processing is performed on said workpiece under a reduced pressure atmosphere; and

Moriya teaches "The gate valve **306** of the auxiliary vacuum chamber **302** which is under normal pressure is opened and the carrier unit **317** is extended to the auto-loader **318** through the opening **305** to carry the wafer **W** from the auto-loader **318** into the auxiliary vacuum chamber **302**. The gate valve **306** is closed and the auxiliary vacuum chamber **302** is exhausted vacuum through the exhaust pipe **319**. The gate valve **304** is opened to communicate the vacuum process chamber **301** with the auxiliary vacuum chamber **302**" (column 11, lines 54-62), which reads on,

a step of opening a means for opening/closing which switchably connects said delivery chamber to said plasma processing chamber for transfer of said workpiece from/to said plasma processing chamber after the step of plasma, wherein the pressure inside said delivery chamber is sustained at a higher pressure than pressure inside said plasma processing chamber.

Moriya differs in failing to teach a step in which said electrode is moved from an upper plasma processing position to a lower delivery position after said the means for opening/closing is opened, **in claim 28**, and wherein after the electrode completes its descent operation, the workpiece is lifted form the mounting surface of the electrode by a lifter pin, **in claim 30**.

Horiuchi teaches, " . . . semiconductor wafer **13** to be processed is conveyed into reaction container **1** through a lock room (not shown) from a wafer cassette of a convey system (not shown). This conveying of semiconductor wafer **13** is achieved according to a predetermined program. Semiconductor wafer **13** is received in higher position than the position of electrode **14**, by lifter pins **17** which have been lifted higher than the upper surface of lower block electrode 14 by lift system 19 through through-holes 16. When lifter pins 17 is lowered (or when electrode **14** is uppered), semiconductor wafer **13** is contacted with the upper surface of lower block electrode **14** through the cooling gas gushed from the electrode **14**" (column 4, line 62 – column 5, line 7). Since Horiuchi uses the same method of delivering the wafer from one chamber (load lock chamber) into a plasma processing chamber like that of the claimed invention, then using Horiuchi's method, reads on step in which said electrode is

moved form an upper plasma processing position to a lower deliver position after the means for opening/closing is opened and would inherently result in wherein after the electrode completes its descent operation, the workpiece is lifted from the mounting surface of the electrode by a lifter pin as in the claimed invention.

It is the examiner's position that tit would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Moriya in view of Komino by using Horiuchi's method of moving an electrode and lifting a workpiece for the purpose of enhancing uniform etching (Horiuchi, column 7, lines 56-62).

Moriya in view of Horiuchi differs in failing to teach the pressure inside said delivery chamber and the pressure inside said plasma processing chamber are set roughly equal to each other before said electrode reaches the lower deliver position, **in claim 29**.

It would have been obvious to one having ordinary skill in the art at the time of the claimed invention to set the pressure inside the delivery chamber to be roughly equal to the pressure inside the processing chamber before said electrode reaches the lower delivery position for the purpose of preventing harmful gases from flowing one chamber into the next chamber.

5. Claims 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Moriya ('522) in view of Horiuchi ('331) as applied to claim 28 above, and further in view of Dhindsa ('799).

Moriya in view of Horiuchi's differs in failing to teach wherein at least a portion of the lifter pin, which contacts the workpiece is electrically conductive.

Dhindsa teaches, "A substrate lifting arrangement **109** includes an actuator **110** and a lifting mechanism **112** having three or more, e.g., four, lifting pins **114** . . . the various components making up the lifting arrangement **109** are typically electrically conductive . . ." (column 1, lines 28-34). Dhindsa further teaches, "However, in accordance with the invention, by controlling the discharge using resistance arrangement **226**, the problem described above in the background of damaging portions of the substrate due to high voltage currents concentrated through small areas of the substrate which are in direct contact with the lifting arrangement may be minimized by proper selection of the resistance for resistance arrangement **226** (column 4, lines 43-50).

It is the examiner's position that tit would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Moriya in view of Komino and further in view of Horiuchi by using a conductive lifting pin as taught by Dhindsa for the purpose of minimizing damage on portions of the substrate (Horiuchi, column 4, lines 45-50).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

ltue
February 10, 2003

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